

Claims

- [c1] 1.– Printed circuit board with insulated metal substrate with integrated cooling system, of the type comprising a metal substrate (10), at least one electrically insulating layer (11) adhered to said metal substrate (10) and several electro-conducting tracks (12) capable of interconnecting electronic power components (24), or a metal layer intended to be transformed into said electro-conducting tracks (12), adhered to said electrically insulating layer (11), characterized in that said metal substrate (10) incorporates several heat transporting channels, which comprise several conduits for a heat-carrying fluid, conduits which extend to the outside of the metal substrate up to a heat transfer area to an external medium.
- [c2] 2.– Board according to claim 1, characterized in that said conduits are conduits for said heat-carrying fluid in close contact with the walls of several cavities (13) formed in the material of the metal substrate (10) in a direction that is substantially parallel to said electrically insulating layer (11), said conduits protruding at least on one edge (19) of the metal substrate (10) and extending

on one portion until reaching said heat transfer area.

- [c3] 3.- Board according to claim 2, characterized in that said heat-carrying fluid conduits are heat pipes (20) that are closed on both ends and partially full of heat-carrying fluid, with an evaporation region (21) inside of the metal substrate (10) and an external condensation region (22) extending with an inclination a distance outside of the metal substrate (10) and which is in contact with the circulating air.
- [c4] 4.- Board according to claim 2, characterized in that said cavities (13) are through cavities.
- [c5] 5.- Board according to claim 1, characterized in that said conduits comprise several cavities (13) placed in a direction that is substantially parallel to said electrically insulating layer (11), at least one of the ends of each one of said cavities (13) opening into an opening (14) located on at least one edge (19) of the metal substrate (10), whose opening (14) is coupled with a span of a pipe (20) for said heat-carrying fluid extending up to said heat transfer area.
- [c6] 6.- Board according to claim 5, characterized in that each one of the cavities (13) has a blind end (16) and has only one opening (14) on one of the edges (19) of the

metal substrate (10) in which said span of pipe (17) is coupled, which is provided with a blind distal end (18), the cavity (13) and pipe (17) assembly constituting a heat pipe in which the cavity (13) performs the functions of an evaporation region (21) inside of the substrate (10) and the span of pipe (17) performs the functions of a condensation region (22) in contact with the circulating air.

- [c7] ^{7.}
~~17.~~– Board according to claim 6, characterized in that the openings (14) have a countersink opening (15) for receiving the ends of the respective spans of pipe (17).
- [c8] 8.– Board according to claim 2 or 5, characterized in that said cavities (13) have a circular cross section.
- [c9] 9.– Board according to claim 2 or 5, characterized in that said cavities (13) have a polygonal cross section.
- [c10] 10.– Board according to claim 4, characterized in that said cavities (13) are parallel to each other and have a longitudinal opening along its entire extension opening onto a side of the metal substrate (10) that is opposite the side thereof on which said electrically insulating layer (11) and electro-conducting tracks (12) are fixed, such that the metal substrate (10) has a cross section shape that is suitable for easily being obtained by extrusion.
- [c11] 11.– Board according to claim 4 or 6, characterized in

that said metal substrate (10) is formed by two layers (10a, 10b) joined together, said cavities (13) being formed by the juxtaposition of two semi-cavities (13a, 13b) formed respectively on each one of the layers (10a, 10b) of metal substrate (10).

[c12]